

Universal Design promotes inclusive products and environments accommodating the widest possible range of abilities and personal preferences. This presentation will introduce the concept of Universal Design and adapting Universal Design for Learning (UDL) into classroom curriculum. There will be an emphasis on and a demonstration of technologies that can help create more flexible and supportive learning environments.

Objectives: Universal Design principles are intended to benefit everyone by addressing common needs we all have. Ideas and values from Universal Design can be used towards designing a more equitable and inclusive learning environment. There is a growing list of computer tools and programs teachers and learner can use to foster a more diverse and effective educational experience.

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2. Objectives

Cover the history of Universal Design, what it is and where it came from.

Introduce you to the basic ideas behind Universal Design.

Discuss an instructional framework with roots in Universal Design – Universal Design for Learning, or, Universal Design in Instruction.

Demonstrate some the things I will be telling you about.

At the end answer any questions you may have.

3. History

The 20th century saw a dramatic change in demographics.

At the beginning of the 20th century, the average lifespan was only 47. People are living longer today. The average lifespan has increased to 76, largely due to healthier living, better medicine and sanitation. More and more people are facing changing conditions and sometimes functional limitations associated with growing older..

This trend will continue with the large number of baby boomers becoming more and more seasoned.

4.

The history of Universal Design can be traced back to the **barrier-free movement in the 1950s**

Two world wars created a huge population of veterans with disabilities. The movement was established in response to demands by disabled veterans to address physical barriers in the environment.

These demographic changes resulted in a population that is older and more. Efforts of the Veterans Administration, a Presidential Committee and the National Easter Seals Society, resulted in development of national standards for "barrier-free" buildings reflected by the American Standards Association. These standards were not enforceable, however, but adopted by a growing number of building contractors and state or local legislative entities.

4. History

The Civil Rights Movement of the 1960s inspired the Disability Rights Movement that greatly influenced the legislation of the 1970s, 1980s, and 1990s. These new laws prohibited discrimination against people with disabilities and provided access to education, public places, telecommunications, and transportation.

Architectural Barriers Act of 1968 mandated the removal of obstacles to employment for people with disabilities in the physical design of buildings and facilities. The Act required all buildings designed, constructed, altered, or leased with federal funds to be made accessible.

5. History

In the last twenty to thirty years a number of federal laws and acts have been enacted to promote inclusion in school, work and public places for those with disabilities.

These laws prohibit discriminating against people with physical and cognitive disabilities and increase educational opportunities. With legislation more people with disabilities are able to participate in a traditional school or work environment.

First time in the 1970s architect, Michael Bednar, introduced the idea that everyone's functional capacity is enhanced when environmental barriers are removed.

Technology Related Assistance for Individuals with Disabilities Act of 1988, Amended 1998 (Tech Act) (P.L. 100-407)

a program of grants to States to promote the provision of technology-related assistance to individuals with disabilities.

Individuals with Disabilities Education Act (IDEA) Intended improve the educational opportunities for children with disabilities. with a **specific focus on the Individualized Education Program (IEP)** ensures that the rights of a free public education for children with disabilities and their parents are protected,

The Rehabilitation Act of 1973 (P.L. 93-112) Section 504 prohibits discrimination against individuals with disabilities and equal **access** to an education. Extends scope of access to individuals with cognitive and sensory disabilities, in addition to those with mobility impairments.

540 - Section 504 of the Rehabilitation Act of 1973 prohibits discrimination against individuals with disabilities in programs and services that receive federal funds, which include the vast majority of educational institutions.

1992 Reauthorization of the Rehabilitation Act Section 508 (P.L. 102-569)

Increases Access To Assistive Technology and requires that Federal agencies' electronic and information technology is accessible to people with disabilities.

Americans with Disabilities Act, 1990 (P.L. 101-336) guarantees equality and opportunity for persons with disabilities in the areas of **Employment, State and Local Government Services & Public Transportation, Public Accommodations** The Americans with Disabilities Act of 1990 (ADA) reinforces and extends the requirements of Section 504 to public programs and services, regardless of whether or not they receive federal funds

6. Definitions and examples

From all of this the term **universal design** (UD) was coined in the early 1970s by Ronald Mace, the founder of the Center for **Universal Design** at North Carolina State University

The design of products and environments to be usable by all people, to the greatest extent possible, without adaptation or specialized design.

An essential component of universal design is that the access features are built in, not added as an afterthought. Adding or modifying later can be expensive and inefficient.

A common theme that you will hear over and over – Everyone's functional capacity is enhanced when environmental barriers are removed. Universal design often helps lots of people with various abilities and preferences.

Probably the most common example of accessible design is the curb cut.

1 Guidelines:

1a. Provide the same means of use for all users: identical whenever possible

1b. Avoid segregating or stigmatizing any users.

From dorm to computer lab story

History of Assistive Technology in the College of Education

Students came to office, equipment was un-usable

Locked in basement in Burge

Technician had to be reserved

What about putting the stuff into an ITC – Inclusion/ equal access

Same hours

Same support

Not have to make special arrangements to use (like other students)

Same environment, same software, hardware, When this happened the equipment got used more by the students who needed it.

2 Guidelines:

2a. Provide choice in methods of use.

2b. Accommodate right- or left-handed access and use.

2c. Facilitate the user's accuracy and precision.

FINGER PRINT SCANNER DEMO

3. Guidelines:

Picture signs for graphic above

Room numbers next to doorway

3b. **Be consistent with user expectations and intuition.**

3c. **Accommodate a wide range of literacy and language skills.**

4. Large display or speaking calculators

Closed captioning

Bobby graphic – web is being used a lot in school and work, make sure sites are accessible.

Guidelines:

Accessible web sites

Text

Contrasting colors

Captioning of audio or movies (for deaf)

Keep site simple and clean, for visual and learning disabilities and ESL.

4a. Use different modes (pictorial, verbal, tactile)

4c. Maximize "legibility" of essential information.

5. Visual enhanced alarms for deaf or hard of hearing– Really attract your attention. Warn those that may have problems of sensory overload, autistic people or those prone to seizures when testing fire alarms.

Guidelines:

5b. Provide warnings of hazards and errors.

5c. Provide **fail safe features**.

6. Guidelines:

6b. Use reasonable operating forces.

6c. Minimize repetitive actions.

6d. Minimize sustained physical effort.

7. Guidelines:

- 7a. Provide a clear line of sight to important elements for any seated or standing user.
 - 7b. Make reach to all components comfortable for any seated or standing user.
 - 7d. Provide adequate space for the use of assistive devices or personal assistance.
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21. Universal Design for Learning –

Along the same time grew a new analysis, a way of thinking about the design and engineering of curriculum named **Universal Design for Learning** that has the potential to improve outcomes for all learners. Technology has a large role in it. Uses new technologies to respond to a variety of individual learner differences. Building 'electronic curb cuts,' in the classroom

Universal design for learning means the design of instructional materials and activities that allow the learning goals to be achievable by people with broad abilities and preferences. Shift emphasis away from individual and to the educational environment.

A premise that calls for curriculum materials be varied and diverse including digital and online resources rather than centering on a single textbook.

Students should be able to choose their preferred method of learning. One child might learn vocabulary by playing a game in a race against the clock; another might create stories or even artwork to incorporate the new words.

Content would be tailored to match kids' interests. My autistic son - tie things to dinosaurs and you've got him engaged.

22.

Because of legislation and societal changes teachers and employers are now facing a wider range of abilities and learning styles than ever before.

People with differences in abilities to:

See, hear or talk

Move – Maybe cannot hold a book or utensil

Read and write

Understand English

Organize or attend/pay attention to information

Process and organize new information.

In today's schools educators are also challenged and held to high stakes accountability to teach all learners to high standards and achievement levels.

23. Like Universal Design things are planned, designed and engineered from the beginning. As new curricular materials and learning technologies are developed, they should be designed *from the beginning* to be flexible enough to accommodate a wide range of individuals, including those with or without disabilities. Trying to adjust or change things after they have been manufactured can be more expensive and inefficient.

This built-in flexibility provides a wider range of options for students to choose from — meaning the curriculum adapts to the student, rather than the other way around.

24. A one-size-fits-all approach to education and preparing people for the world of work and higher education simply does not work. UDL provides a blueprint for rethinking and guiding:

Setting educational, personal, job goals.

Methods and strategies of engagement
Materials development
Assessment that accommodate personal differences.

Universal design does not mean that the instructional materials and activities accommodate students by lowering standards "dumbing down" the curriculum or not challenging students. It means more flexibility and a wider range of activities and material rather than stringent uniformity to specific strategies or media.

25. Three Essential Qualities of Universal Design for Learning

Multiple means of representation to give learners various ways of acquiring information and knowledge.

Adjust to the diverse ways in which students are able to recognize and understand information. Perhaps having both print and graphical formats available so that information can be obtained in a variety of ways for verbal or spatial learners.

Multiple means of expression provide learners alternatives for demonstrating what they know.

Students can respond with their preferred means of output. For example, one student could write an answer while another speaks an answer or makes a multiple choice response on a standardized test while another submits a **portfolio** or learning artifact. The assessment should be able to accommodate different learning styles and abilities.

Multiple means of engagement to tap into learners' interests, challenge them appropriately, and motivate them to learn.

Personal interests or preferred style of learning are matched with the presentation or reinforcement of new knowledge. A student might be able to go to a picture or graphic at any time in the middle of a reading passage or get words quickly defined, whatever it is that might help keep the student engaged and not get lost, discouraged or bored. ~~Universally designed learning materials will have the ability to learn and remember the individual student's patterns and preferences.~~

26. Implied methods and strategies

The essence of UDL is flexibility and the inclusion of alternatives and student choice to adapt to the variations in learner needs, styles, and preferences. Plan for a variety of strategies and methods.

Lecture followed with collaborative options or independent learning opportunities.

Demonstrations

Computer programs – Steve Jump Start Second Grade, learning how to make change, worksheets were not grabbing his attention, but a computer program where he had to manipulate a vending machine to get snacks and prizes. Kept his attention.

Wireless laptops

Provide extra graphics and illustrations

Guidance towards Internet sources of information.

Encourage fieldwork or sponsored internships

Electronic versions of textbooks and other curricular materials

Captioned and/or narrated videos – My autistic does not like it, perhaps too much information or stimulation.

Word processors with spell checkers, thesauri and word prediction

Voice recognition – Writing is a challenge for my son, hates homework because of the writing involved not because of the content or difficulty. Does better when he can use a word processor for writing, voice recognition is the next step.
Options to use screen readers that read computer screens out loud.
Outlines, indexes, summaries, study guides on important concepts and principles.
Generate flowcharts and concept maps for complex processes and ideas
Presentations as options for demonstrating knowledge.

A lot of teachers are already doing a lot of these things. Whenever a student makes an electronic slideshow, goes to the Internet for information, checks out a digital camera to take a picture for a report, scans a photograph to include in a biography are differentiating instruction and using elements of Universal Design for Instruction.

27. Digital text

The backbone of many UDL efforts

Take all text information in the classroom and digitize it. When text is digitized, entered into a computer it can be
enlarged

spoken out loud with the computer

colored or highlighted

Embossed to Braille

Or supplemented with supports like links to additional information from an electronic dictionary, post-it notes with quick tips from the teacher,

The printed text book can be an unyielding resource and a barrier to some students while digital media are flexible and can be adjusted. Some students can be blocked learning because of an inflexible text that may create physical, sensory, affective, or cognitive barriers.

~~Digital multimedia are not, however, inherently accessible. Multimedia can be just as inaccessible as printed textbooks. Computer learning games, for example, are usually highly inaccessible to many students; the images are inaccessible to blind students, prompts and feedback are inaccessible to deaf students, the graphical explanations are inaccessible to students using screen readers to read text out loud. All of these barriers are avoidable with proper design of the software. The inherent flexibility of multimedia creates an opportunity for UDL, but only proper design can make it a reality.~~

28. There are various on-line libraries of digital books, magazines and newspapers with huge offerings teachers can use in the classroom for different subject areas from books on Arts and Humanities to Science and Technology; from Aesop to Dickens.

29 - 30. UDL versus Assistive Technology

Though originally they started from quite different histories and directions Universal Design for Learning and Assistive Technology often intersect and sometimes are the same thing. They do share a lot of the same history and tools, UDL is often built upon the same tools and concepts used in assistive technology. The purpose of universal design and assistive technology is the same: to reduce barriers.

AT's increasingly widespread use and acceptance in schools and world of work may pave the way for where *all* people benefit from the technology conceived for the betterment of a few

There are subtle differences.
How do they differ?

Universal design

The design of products and *environments* to be usable by all people, to the greatest extent possible, without adaptation or specialized design. UDL includes accommodations from the beginning to be accessible to most students. Assistive technology first "requires a performance deficit" and then "...seeks to adjust individual students to an inflexible, often print-based curriculum."

UDL involves designing inclusive environments that are accessible to everyone, with and without disabilities. A teachers' efforts are sometimes ineffective because if students perceive the adaptations as "different" or feel stigmatized by them, they may be reluctant to use them (Ellis, 1997).

30. In a nutshell UDL is **proactive** – Learners and workers typically have assistive technology at home, universal design and digital text gives them more opportunities to use the tools they already have. email -

31. RESEARCH

A lot of research to back up the benefits of using, offering students a variety of learning materials and learning strategies to choose from. I've seen a lot of educational fads and this one seems to have strong research and theory legs to run on.

Merrill (1983) Component Display Theory

A significant aspect of the CDT framework is learner control, i.e., the idea that learners can select their own instructional strategies in terms of content and presentation components. Students can adapt learning to meet their own preferences and styles. Saw benefits when learners can select their own instructional strategies and presentation components. Bring up a map, diagram, definitions, outlines.

Let the student be a partner in negotiating and choosing the tool that works best for them.

Multiple Learning Styles and Technology. Students benefit from exploring different strategies for different learning styles. As the variety of types of media which information is conveyed are increased, students assimilate more knowledge and are able to better apply it. (Rockman *et al*, 1996)

Using technology to individualize reading Instruction. Options to have text talked outloud improved comprehension for some students. (Rose & Dalton, 2002) WestEd's Regional Technology in Education Consortium

Los Angeles Scientific Evaluation 2004

Supplements of digital video and multimedia-based learning improved outcomes in math, (Boster, 2004)

Same results found in rural Virginia showing improvements in 3rd and 8th grade science and social studies scores.

BRAIN RESEARCH (Differentiated Instruction)

Each person is different when it comes to learning

Each person is different when it comes to their learning. Each person varies with their

Recognition networks

Gathering facts. How we identify and categorize what we see, hear, and read.

Strategic networks

Planning and performing tasks. How we organize and express our ideas.

Affective networks

How students are engaged and motivated. How they are challenged, excited, or interested.

One of the most important revelations stemming from brain research is that there are no "regular" students each student brings a unique assortment of strengths, weaknesses, and preferences to school

What Brain Research Tells Us About Learner Differences

1. To support diverse recognition networks, provide multiple, flexible methods of presentation.
 2. To support diverse strategic networks, provide multiple, flexible methods of expression and communication.
 3. To support diverse affective networks, provide multiple, flexible options for engagement.
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Iowa Text Reader Project 2004-2005; Recently completed.

Spearheaded mostly by a group of AEAs and other named the "Iowa Assistive Technology Liaison"

73 middle school students with reading problems across then state and their teachers were trained to use a text reader (Kurzweil 3000). Scans and reads text outloud. For a 23 week period the students used the Kurzweil system to read. Skills were assessed with reading problems twice a month over the 23 week period.

Not only can the Kurzweil read text outloud – teachers can also use "embedded study skills" within the text.

Such as the electronic highlighters for highlighting specific words or passages, electronic sticky notes and voice notes for pre-reading questions, and support for vocabulary include an on-line dictionary, thesaurus, and spelling tools.

The outcomes showed improved reading fluency and comprehension, as well as bringing out positive responses and feelings from the students and teachers implementing the text reader project.

The average reading rates improved by 16 words per minute in 23 weeks. This is an average rate of improvement 2.3 times faster than predicted otherwise.

Positive outcomes from students and teachers associated with the use of the text reader software included improved academic performance, better on task behavior, more engagement in the instructional materials, and improved independent work completion.

~~95% liked the software. 91% thought it was pretty easy or very easy to learn. 93% reported it helped them with their reading. 72% reported it helped them stay on task. 86% reported it helped them work better independently. 79% reported it helped them earn better grades on tests. 56% reported it helped them have better attendance at school. 77% reported it helped them feel better about themselves. 75% reported it helped interest them in what they were learning. 84% reported it helped them understand what was written in their books. 81% reported it helped them get their work done. 58% reported it improved how well they wrote. See attached survey results.~~

~~100% liked using the Kurzweil text reader. 78% said it was easy to use. 33% thought it was somewhat difficult to use while none said it was very difficult to use. 100% reported it helped their students read. 100% reported it helped their students stay on task. 100% reported it helped their students work independently. 88.9% reported it helped their students get better grades on tests. 22% reported it increased attendance at school. 89% reported it helped students feel better about themselves. 89% reported it improved students' interest in what they are learning. 100% reported it helped students understand what is written in their books. 100% reported it helped students complete their work. 55% reported it helped students improve how well they wrote. See attached survey results.~~

Summary

~~Seventy three students from across the state of Iowa participated in a 23 week study of the impact of the use of a text reader software program on multiple measures of academic performance. Enhanced performance was observed in the areas of reading fluency and comprehension. Positive correlations were found between the teachers' level of implementation and the students' progress on reading fluency and comprehension. The kids who used it more performed better.~~

FINALLY

Issues and barriers

Teacher Education should be doing a better job of making everyone aware and well-versed on the technical issues of inclusions and we are attempting this with ICATER.

In the end everything can't be on the shoulders of just one person; the teacher. It takes a team. Educators, librarians, parents, support staff, computer lab managers, and others should have access to training towards designing accessible facilities and activities so all persons can use technology for their maximum benefit as they pursue academics and careers.

Costs

Some of the stuff is pricy in terms of time and equipment. The best that can be said is that costs should decrease. Seek negotiated purchasing pricing with vendors by your school or company, AEA or state. For some things the state has licensed these products for half the retail price.

Lots of people who need the tools may already have them, give them the flexibility and means to use them. The teacher likely has a lot of the materials already on disk or computer, make digital media available to them.

May be able to make a stronger case for funding by taking the Universal Design for Learning approach arguing making technologies available to everyone, not just to a few targeted individuals.

Also some research shows it can improve learning and achievement, look for local, state-wide or nationally grants or foundations for help in improving achievement and inclusion. Focus on the technologies the school already has. Word and Inspiration already have the ability to insert live speech.

Macintosh OSX and Windows have features that can accommodate different styles and preferences:

Enlarging the screen

- Keyboard navigation- eliminates need for mouse
- Mouse keys- allows mouse movement through keypad
- On-Screen Keyboard, using only the mouse (track ball or joy stick)

Iowa study - Concerns expressed focused on the time commitment of scanning and editing the text

Future – Who knows, more research on technical accommodations that enhance learning. Someday maybe a *seamless transition* of availability of technology for all people as they move from K-12 to postsecondary to career environments.

References – See slide

Inspiration – Creating graphic organizers or flow charts, for school or work. Helps students see relationships or complex structures. Use of graphic organizers in pre-reading helps students relate new information to their existing knowledge. (Novak & Gowin, 1984)

Kurzweil – Scans and read text out loud and allows embedding learning supports in content, insert a story map or visual summary, questions about content, periodically summarizing key points, testing for knowledge.

Dragon Dictate – Voice recognition to communicate with computer instead of typing or mousing for physical, cognitive and personal abilities-preferences.